

CHAPTER

7

Graphics and Color

When you complete this chapter, you will be able to:

- Understand the differences between the Web-based image file formats: GIF, JPG, and PNG
- Know which type of file format to use for which type of image
- Understand the basics of computer color
- Use the element and attributes to display images effectively
- Use hexadecimal color values to add color to your pages

Using graphics and text together is the characteristic that makes the Web so attractive and popular, but it also can be the undoing of many Web sites. Use graphics wisely, and you can create an attractive and engaging Web site. If you use too many images or graphics that are too large or complex, your user will have to endure long download times, and they may not wait. Balance the mixture of images and text, and use the image capabilities of HTML to suit your user's needs. Test your work in a variety of browsers and at a range of connection speeds to make sure downloading your graphics does not discourage your readers.

The incorrect use of color in many Web sites creates unreadable text or navigation confusion for the user. Use color judiciously to communicate and to guide the reader, or to create branded areas of your site. Test your color choices carefully to make sure they appear properly across different browsers.



FILE FORMAT BASICS

You currently can use only three image file formats on the Web: GIF, JPG, and PNG. These formats all compress images to create smaller files. Knowing which file format to use for which type of image is important. If you choose the wrong file type, your image will not compress or appear as you expect. Color depth (described in the “Color Basics” section of this chapter) is a factor in image file format as well. Of the three Web-based image file formats, JPG supports 24-bit color, GIF supports 8-bit color, and PNG supports both 8-bit and 24-bit color. The file format’s color depth controls the number of colors the image can display. The greater the bit depth, the greater the number of colors that can be displayed.

GIF

The **Graphics Interchange Format (GIF)** is designed for online delivery of graphics. GIF uses a lossless compression technique, meaning that no color information is discarded when the image is compressed.

The color depth of GIF is 8-bit, allowing a palette of no more than 256 colors. In fact, the fewer colors you use, the greater the compression, which results in smaller file size. The GIF file format excels at compressing and displaying flat color areas, making it the logical choice for line art and color graphics. Because of its limited color depth, GIF is not the best file format for photographs or more complex graphics that have gradations of color, such as shadows and feathering.

GIF Transparency

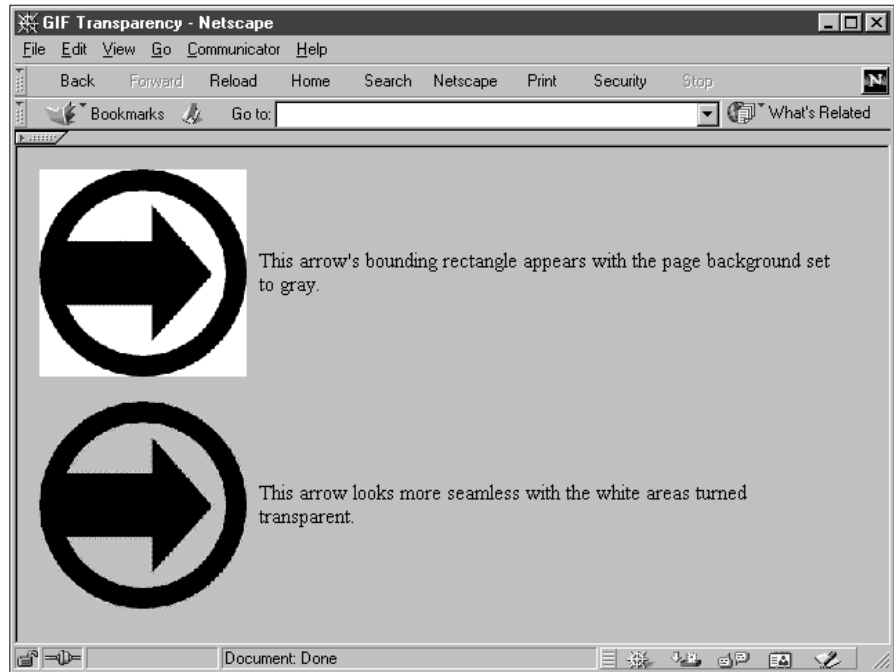
With GIF files you can choose one color in an image to appear as transparent in the browser. The background color or pattern will show through the areas that you have designated as transparent. Using transparent areas allows you to create graphics that appear to have an irregular outside shape, rather than being bounded by a rectangle. Figure 7-1 shows the same shape with and without transparency.

You can create transparent areas using a graphics editor. When you choose the transparent color, all pixels of that color in the image will let the background color show through. In Figure 7-1, white was chosen as the transparent color.

GIF Animation

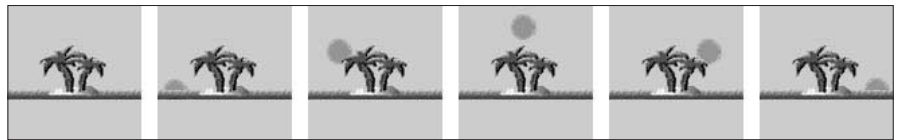
The GIF format lets you store multiple images and timing information about the images in a single file. This means that you can build animations consisting of multiple static images that play continuously, creating the illusion of motion. This is exactly the same technique used in cell-based animation. You can create animated GIFs with a variety of both shareware and commercial software.

FIGURE 7-1
Transparent and
non-transparent GIFs



When you create a GIF animation, you can determine the time between frames and the number of times the animation plays. With a little imagination, you can create all types of effects including text scrolls, color changes, animated icons, and slide shows. Figure 7-2 shows a series of individual GIFs that can be combined to play as an animated GIF. The final GIF animation file is a single file whose name ends in the .GIF extension.

FIGURE 7-2
Individual frames of a
GIF animation



GIF animation is somewhat limited when compared to the results of other proprietary animation tools such as Macromedia Shockwave or Flash, which can play synchronized sounds and allow Web users to interact with the animation. Creating animations with these applications, however, requires browser plug-ins, and viewing the animations demands heavy download times. Unlike most proprietary tools, you do not need any special plug-ins to view animated GIFs, and, if you limit color and motion when creating your animations, you can keep your file sizes small for faster downloads.

Use restraint when adding animated GIFs, such as blinking icons and scrolling banners, to your pages. Users may find them annoying because they are repetitive and distract from the page content. Consider choosing to play an animation only a certain number of times rather than letting them loop endlessly.

You can create animated images with GIF animation software. These tools streamline the process of setting the timing, color palette, and individual frame effects. See Table 7-1 for a list of GIF animation tools.

TABLE 7-1
GIF animation tools

Microsoft Liquid Motion	www.microsoft.com/liquidmotion
GIF Construction Set Professional	www.mindworkshop.com/alchemy/gifcon
Ulead GIF Animator	www.webutilities.com/products/gani

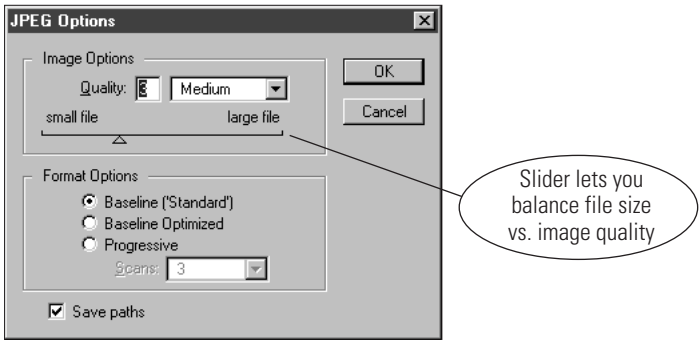
JPG

The **Joint Photographic Experts Group (JPG)**, sometimes called **JPEG** format is best for photographs or continuous tone images. JPGs are 24-bit images that allow millions of colors. Unlike GIFs, JPGs do not use a palette to display color.

JPGs use a lossy compression routine specially designed for photographic images. When the image is compressed, some color information is discarded, resulting in a loss of quality from the original image. Since the display device is the low-resolution computer monitor, the loss of quality usually is not noticeable. Furthermore, the resulting faster download time compensates for the loss of image quality.

Using Adobe Photoshop or other imaging software, you can translate photographic images into JPG format. When you create the JPG file, you also can balance manually the amount of compression versus the resulting image quality. Figure 7-3 shows the Photoshop JPEG Options dialog box as an example.

FIGURE 7-3
Photoshop's JPEG Options dialog box



TIP

Whether you are creating GIFs or JPGs, remember always to save an original copy of your artwork or photo. Both file formats permanently degrade the quality of an image as a result of compression. Once you have converted to GIF or JPG you cannot return to the original image quality.

The Image Options slider lets you adjust the quality of the file. The higher the compression, the lower the image quality. You can play with this setting to create good-looking files that are as small as possible. Many photos can sustain quite a bit of compression while still maintaining image integrity.

PNG

The **Portable Network Graphics (PNG)** format is designed specially for the Web. PNG has been available since 1995, but has been slow to gain popularity because of its lack of browser support. It is a royalty-free file format that is intended to replace GIF. This lossless format compresses 8-bit images to smaller

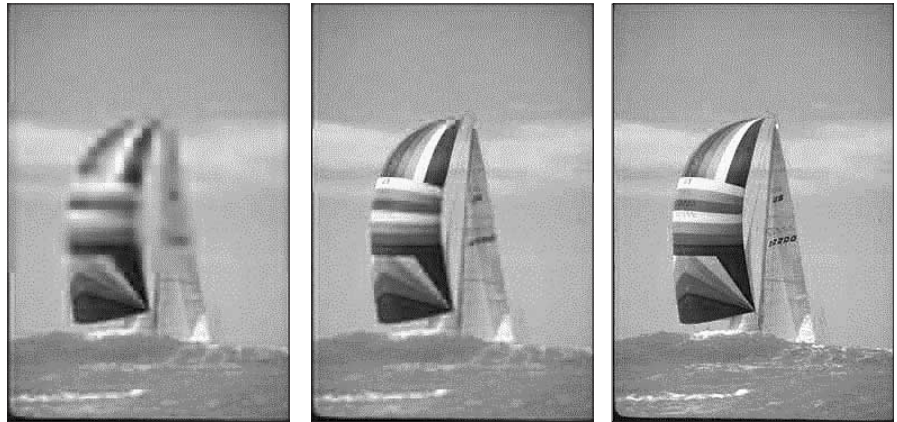
file sizes than GIF. PNG also is intended to work as an image-printing format, so it supports 8-bit indexed-color, 16-bit grayscale, and 24-bit truecolor images. Even though PNG supports 24-bit color, its lossless compression routine does not compress as efficiently as JPG.

PNG supports transparency and interlacing but not animation, although the World Wide Web Consortium has created a draft specification for a Multiple-image Network Graphics format—MNG, which will support animation. One useful feature of PNG is its built-in text capabilities for image indexing, allowing you to store a string of identifying text within the file itself. Now that browser support is improving for PNG, designers can start to use it more often.

USING INTERLACING AND PROGRESSIVE DISPLAY

Most Web-capable graphics editors let you save images in an interlaced or progressive format. You can choose this display option when creating GIF, PNG, and JPG files. GIF and PNG files use an interlacing format, while JPG files use a progressive format. Interlacing and progressive formats generally are the same thing—the gradual display of a graphic in a series of passes as the data arrives in the browser. Each additional pass of data creates a clearer view of the image until the complete image is displayed. Figure 7-4 shows three rendering passes to display a complete image.

FIGURE 7-4
*Three passes complete
this progressive
JPG image*



The only real advantage to displaying graphics in both methods is that users see a blurred view of the complete image, giving them something to look at while waiting for the entire graphic to download. The disadvantage of choosing this display method is that older browsers may not display the graphic properly, and more processing power is needed on the user's machine to render the image.

WHERE YOU CAN FIND IMAGES

You can acquire images from a variety of sources. One way is from a graphics professional you hire to create and prepare your images. If your budget does not allow for funding this service, consider one of the following resources:

- *Stock photo collections:* Stock photo collections can cost from thousands of dollars for a few images to under \$20.00 for thousands of images at

your local computer discount store or mail-order retailer. These collections contain royalty-free images that you can use for any Web site. You can manipulate the graphics to add or delete text or images, change the color, or make any other modifications. Most stock photo collections include a built-in browsing program that lets you search for a particular image, and some also provide basic image-editing software.

- *Digital camera:* A digital camera lets you take your own photos and use them on the Web. These cameras store photos in JPG format, so you do not have to convert them. Most also provide image-cataloging software, and some include basic image-editing software. The price of digital cameras continues to decline, while the quality of the images remains quite good.
- *Scanner:* Good scanners are available for under \$150.00. You can scan your own photos or images, and save them as GIF, JPG, or PNG files for use on your Web site. Remember to set the scanner resolution to 72 dpi to match the computer display resolution.
- *Public domain Web sites:* Many Web sites maintain catalogs of images online that are available for download. Some of these sites charge a small membership fee, so you can freely download as many images as you want. Other public domain Web sites are completely free.
- *Create your own:* If you need a basic image or if you have graphic design skills, you can download a shareware graphics tool and learn to use it. Keep the type of image you create simple, such as text on colored backgrounds, and use fundamental shapes and lines. Look at examples of the graphics on other Web sites. Many are simple but effective and may provide a useful model for your own images.
- *Clip art:* Clip art is a viable alternative for the Web, especially as more polished collections become available for sale on CD-ROM. Price generally corresponds to quality for clip art—if you pay \$9.95 for 20,000 images, the quality of the images most likely will reflect the cost. You also can use a graphics program to customize clip art to meet your particular needs.

TIP

Do not borrow images from other Web sites. Although your browser allows you to copy graphics, you should never use someone else's work unless it is a public domain Web site and freely available for use. New digital watermarking technology lets artists copyright their work with an invisible signature. If you use someone else's graphics, you may find yourself in a cyber-lawsuit.

CHOOSING THE RIGHT FORMAT

The following list summarizes the advantages and disadvantages of each graphic file format for the Web.

- *GIF:* The everyday file format for all types of simple colored graphics and line art. Use GIF sparingly for its animation capabilities to add visual interest to your pages. GIF's transparency feature lets you seamlessly integrate graphics into your Web site.
- *JPG:* Use JPG for all 24-bit full-color photographic images, as well as more complicated graphics that contain color gradients, shadows, and feathering.
- *PNG:* If the browsers are supporting it, use PNG as a substitute for GIF. Because PNG does not compress your 24-bit images as well as JPG, do not use it for photos.

COMPUTER COLOR BASICS

Before you create or gather graphics for your Web site, you need a basic understanding of how color works on computer monitors.

Your computer monitor displays color by mixing the three basic colors of light: red, green, and blue. Each of these three basic colors is called a color channel. Your monitor can express a range of intensity for each color channel, from 0 (absence of color) to 255 (full intensity of color). Colors vary widely from one monitor to the next, based on both the user's preferences and brand of equipment.

COLOR DEPTH

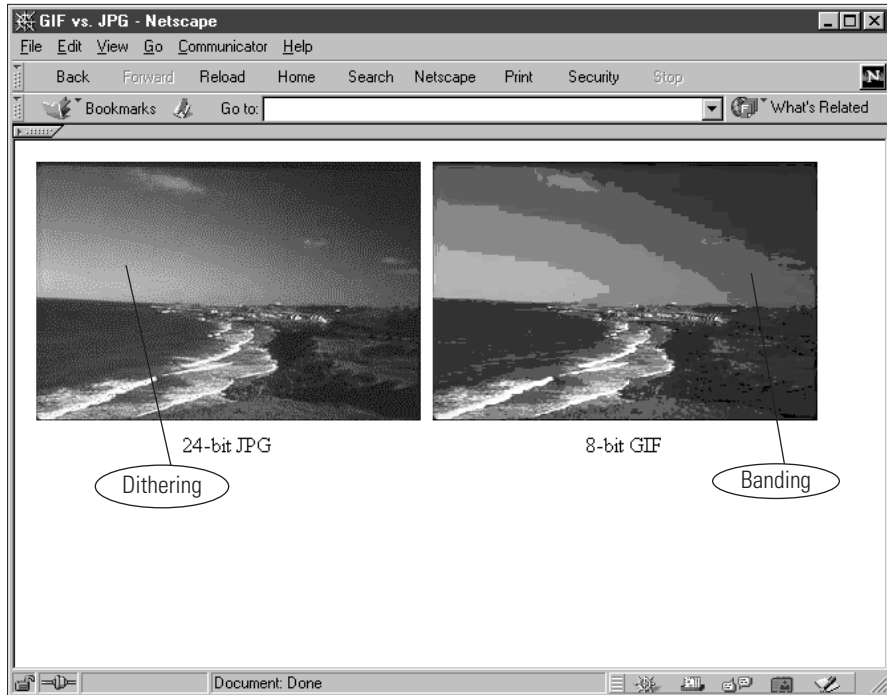
The amount of data used to create color on a display is called the **color depth**. If your monitor can display 8 bits of data in each of the 3 color channels, it has a 24-bit color depth ($8 \times 3 = 24$). 24-bit images can contain almost 17 million different colors and are called true color images. Both JPG and PNG support 24-bit color. If your users have a 24-bit color display, they can appreciate the full color depth of your images. But many monitors cannot display 24-bit images. Some have only 16-bit color depth (called high color) and some have only 8-bit color depth. If your monitor does not support the full color depth of an image, the browser must resort to mixing colors that attempt to match the original colors in the image.

DITHERING

The browser must mix its own colors when you display a 24-bit image on an 8-bit monitor, or in a file format that does not support 24-bit color. Since the 8-bit monitor has fewer colors to work with (256, to be exact), the browser must try to approximate the missing colors by creating colors from the ones the browser already has. This type of color mixing is called dithering. **Dithering** occurs when the browser encounters a color that it does not support, such as when you try to turn a 24-bit photographic image into an 8-bit, 256-color image. Dithered images often appear grainy and pixelated. The dithering will be most apparent in gradations, feathered edges, or shadows. Figure 7-5 shows the same image in both JPG and GIF format at 8-bit, 256 colors.

The JPG file on the left has a lot of dithering in the sky area of the photo, where the browser was forced to mix colors to approximate the existing colors in the image. The GIF file on the right exhibits a different type of color matching called banding. Unlike dithering, **banding** is an effort to match the closest colors from the GIF's palette to the original colors in the photo. When you create a GIF, you can choose whether or not to use dithering. A non-dithered image will be smaller than one that uses dithering, but the banding may create an unacceptable image. JPGs, when viewed on an 8-bit or 16-bit display, will dither to the closest colors. Photos are best saved as JPGs, even when viewed at a lower color depth, because the dithering creates a more acceptable image.

FIGURE 7-5
*24-bit images on an
 8-bit display*



USING NON-DITHERING COLORS

One way to control the dithering process is to create images that use non-dithering colors. The 216 non-dithering colors that are shared by PCs and Macintoshes are called the Web palette or browser-safe colors. The non-dithering palette only applies to GIF or 8-bit PNG, not 24-bit JPG. These colors display properly across both platforms without dithering. Most Web-capable graphics programs include the Web palette colors. If you do create graphics for the Web, to avoid trouble use the Web palette as your color palette for all flat-color areas of your graphics.

CHOOSING A GRAPHICS TOOL

As a Web designer, you may be in the enviable position of having a complete staff of graphic design professionals creating and preparing graphics for your site. Most Web designers, however, do not have this luxury. Whether you want to or not, you eventually must use a graphics tool. Most of your graphics tasks will be simple, such as resizing an image or converting an image from one file format to another. More complex tasks could include changing color depth or adding transparency to an image. These are tasks that anyone can learn to do, using any of the popular graphics software currently available.

When it comes to creating images, you may want to enlist professional help. Your Web site will not benefit if you choose to create your own graphics and you are really not up to the task. Professional-quality graphics can greatly enhance the

look of your Web site. Take an honest look at your skills and remember that the best Web sites usually are the result of a collaboration of talents.

You will use graphics software to create or manipulate graphics. Most Web designers use Adobe Photoshop. This is an expensive and full-featured product that takes time to master. Adobe Illustrator, a high-end drawing/painting tool, also is available. Other commercial tools you can consider include Ulead PhotoImpact and Macromedia Fireworks. Most are available as downloadable demos, so you can try before you buy. In general, look for a tool that meets your needs and will not take a long time to learn. Table 7-2 shows a list of Web sites for the graphic tools mentioned in the text.

TABLE 7-2

*Graphic tools
Web sites*

Adobe Photoshop and Illustrator	www.adobe.com
Graphic Workshop Professional	www.mindworkshop.com/alchemy/gwspro
LView Pro	www.lview.com
Macromedia Fireworks	www.macromedia.com
Paint Shop Pro 6	www.jasc.com
Ulead PhotoImpact	www.ulead.com

TIP

Graphic Tools Web Sites

The list in Table 7-2 is not exhaustive, and you may have to try different tools to find the one that suits your needs.

Of course, you also can choose from a variety of shareware graphics tools. Three of the more established tools are Paint Shop Pro 6, LView Pro, and Graphic Workshop Professional. These tools are each priced under \$100 and contain a full range of image-editing features. Like most other shareware, you can download and work with these tools for a trial period.

USING THE ELEMENT

By definition, is a replaced element, meaning that the browser replaces the element with the image file referenced in the SRC attribute. is an empty element, so never use a closing tag with it. The browser treats the image as it treats a character; normal image alignment is to the baseline of the text. Images that are within a line of text must have spaces on both sides, or the text will touch the image.

The element only needs the SRC attribute to display an image in the browser. The following is a valid element that displays a GIF file named logo:

```
<IMG SRC="logo.gif">
```

This simplified use of the element, however, does not take advantage of the wide variety of valid attributes. Table 7-3 lists the most commonly used attributes.

TABLE 7-3
* element*
attributes

Attribute	Use
ALIGN	Specifies the position of the image in relation to the surrounding text
ALT	Displays an alternate string of text instead of an image if the user has a text-only browser or has graphics turned off. The Internet Explorer 4.0+ and Netscape Navigator 4.0 browsers display the ALT value as a pop-up window when a mouse points to the image.
BORDER	Determines whether a border appears on the image. State the border value in pixels. You can use this attribute to turn off the hypertext border if the image is a link.
HEIGHT	Specifies the height of the image in pixels
HSPACE	Specifies the amount of horizontal white space on the left and right sides of the image, in pixels
SRC	The only required attribute, SRC specifies the URL of the graphic file you want to display. As with any URL, the path must be relative to the HTML file.
VSPACE	Specifies the amount of vertical white space on the top and bottom sides of the image, in pixels
WIDTH	Specifies the width of the image in pixels

REPLACING ATTRIBUTES WITH STYLE SHEETS

ALIGN, BORDER, VSPACE, and HSPACE have been deprecated in HTML 4.0 in favor of CSS. Table 7-4 shows the equivalent CSS properties that replace these attributes.

TABLE 7-4
CSS properties
that replace IMG
attributes

Deprecated Attribute	Equivalent CSS Property
ALIGN	FLOAT allows you to flow text around an image or other object Example: <code>IMG {FLOAT: LEFT}</code>
BORDER	BORDER lets you set a border on an image, or remove the border from a linked image
VSPACE and HSPACE	The PADDING or MARGIN properties set white space around an image. You can control individual sides of the image, or apply white space around the entire image.

Style properties usually are expressed as global rules that specify the characteristics for every occurrence of an element. The variety of uses for graphics

on a Web page defy a homogenous rule. For example, the following style rule makes all images left-aligned:

```
IMG {FLOAT:LEFT}
```

This rule may be too restrictive because every image in the document will be left-aligned. A good alternative is to express the style information using the `STYLE` attribute in the `` element. For example, the following code shows two images, one left-aligned and one right-aligned:

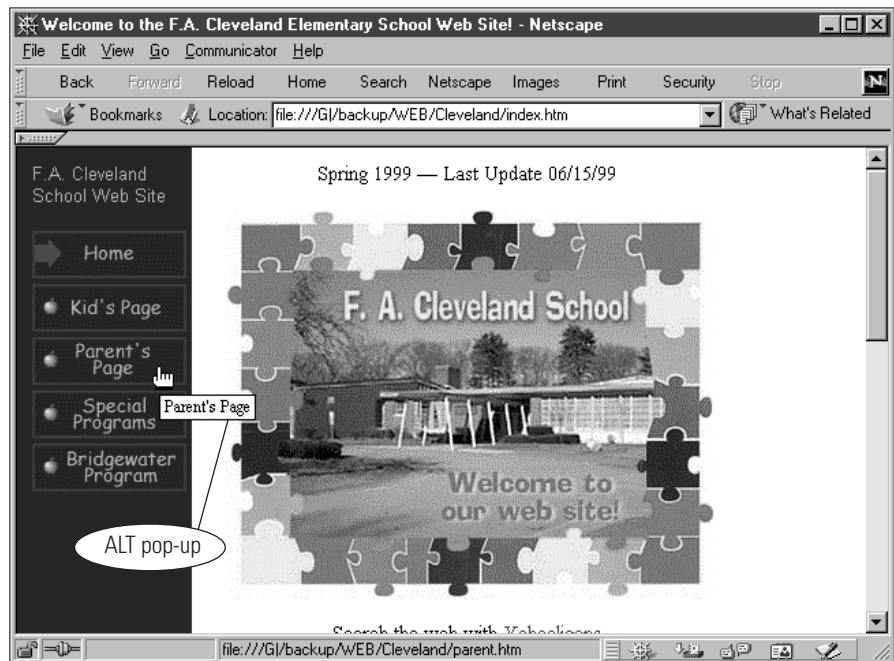
```
<IMG SRC="logo.gif" STYLE="FLOAT:LEFT" WIDTH=40 HEIGHT=40
  ALT="Company Logo">
<IMG SRC="product.gif" STYLE="FLOAT:RIGHT" WIDTH=80
  HEIGHT=60 ALT="Our Product">
```

Many of the standard CSS text properties can be used with the `` element. This chapter includes both standard HTML code and, wherever applicable, the equivalent CSS properties expressed using the `STYLE` attribute.

SPECIFYING ALT ATTRIBUTE TEXT

In Chapter 4, you learned about the benefits of including ALT attribute text. The ALT attribute text is displayed if the image does not appear, providing a description of the image. In both Internet Explorer 4.0/5.0 and Netscape Navigator 4.0, the ALT attribute text also appears as a pop-up when the user places the cursor over the image, as illustrated in Figure 7-6.

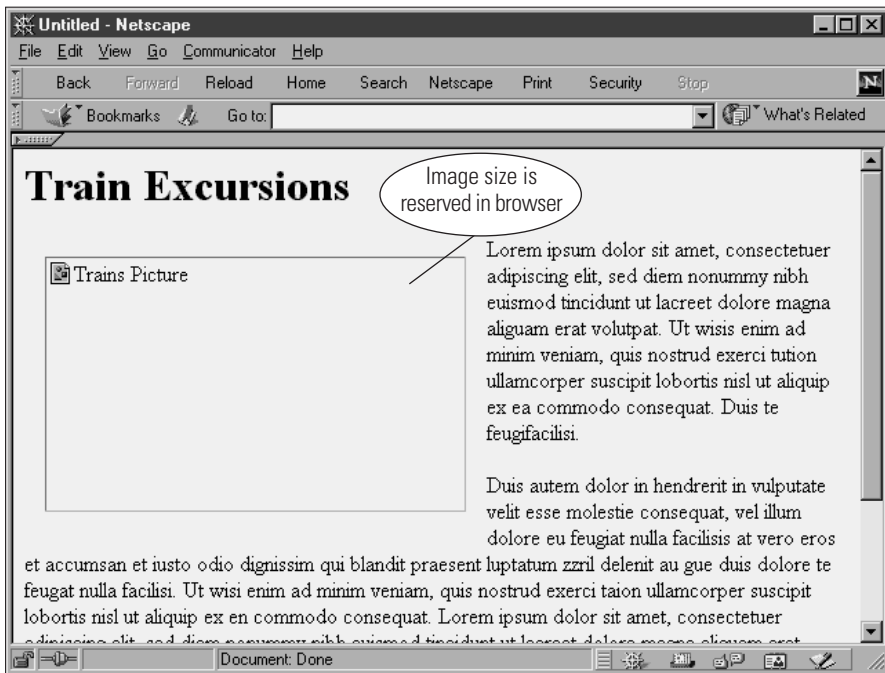
FIGURE 7-6
*Value of ALT attribute
text displays
in a pop-up text box*



SPECIFYING IMAGE WIDTH AND HEIGHT

Every element on your Web site should contain WIDTH and HEIGHT attributes. These attributes provide important information to the browser by specifying the amount of space to reserve for the image. This information dramatically affects the way your pages download, especially at slower connection speeds. If you have included the width and height, the browser knows how much space the image needs. The browser reserves the space on the page, without waiting for the image to download, and displays the rest of your text content. If the browser does not know the width and height values, it must download the image before displaying the rest of the page. This means the user will be looking at a blank page, while waiting for the image to download. Figure 7-7 shows the result of including the width and height.

FIGURE 7-7
*Image size reserved
in the browser*



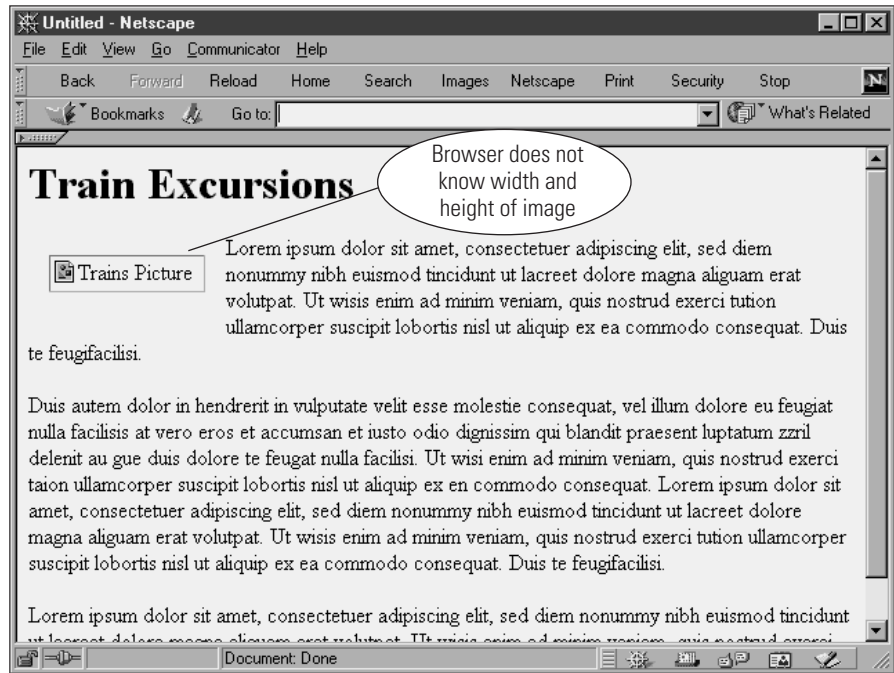
Following is the code for the image showing the WIDTH and HEIGHT attributes. It indicates the browser should reserve a 305 x 185 pixel space for the trains.gif image, and should display the alternate text “Trains Picture” if it cannot display the image.

```
<IMG SRC="trains.gif" WIDTH=305 HEIGHT=185 ALT="Trains
Picture">
```

If you are not using tables, set the width and height to preserve the look of your layout, whether the images are displayed or not. In Figure 7-8, the width and height have been omitted. Notice that when the browser does not know

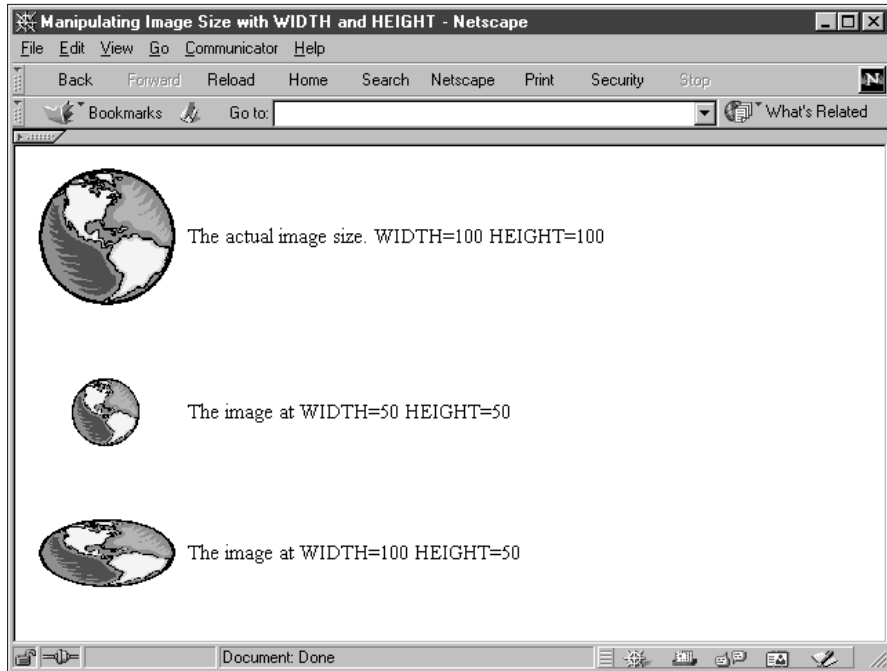
the width and height, the text wrapping and appearance of the page change dramatically when the image is not displayed.

FIGURE 7-8
*Browser unable to
reserve image size*



If you experiment, you will notice that you can manipulate the width and height of the image itself using the `WIDTH` and `HEIGHT` attributes in the `` element. While it is tempting to use these attributes to change graphic size without opening a graphics program, it is not a good idea. If the original graphic's area is too large and you reduce the size using the `WIDTH` and `HEIGHT` attributes, you are not changing the file size of the image—only the area that the browser reserves for the graphic. The user still is downloading the original graphic file. Also, if you do not maintain the ratio of width to height, you distort the image. Figure 7-9 shows an image in its actual size, the size after changing the width and height values in proportion to one another, and the distorted size caused by incorrect width and height values.

FIGURE 7-9
*Manipulating images
 with WIDTH and
 HEIGHT attributes*



In the following code for the three images, the WIDTH and HEIGHT attributes are highlighted:

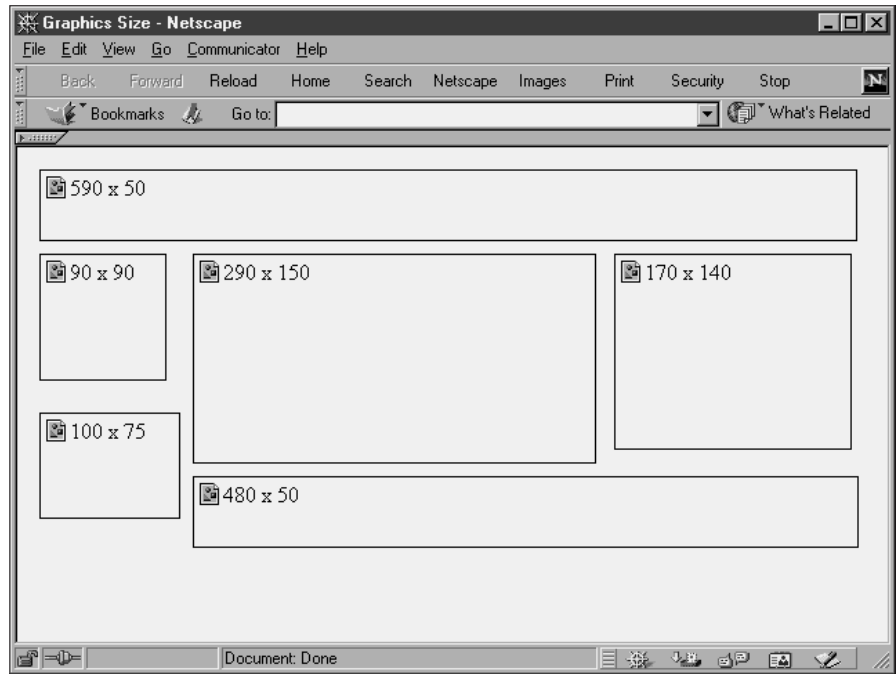
```
<!-- Globe 1 -->
<IMG SRC="globe1.gif" WIDTH=100 HEIGHT=100 ALT="Globe">
<!-- Globe 2 -->
<IMG SRC="globe1.gif" WIDTH=50 HEIGHT=50 ALT="Globe">
<!-- Globe 3 -->
<IMG SRC="globe1.gif" WIDTH=100 HEIGHT=50 ALT="Globe">
```

The ability to manipulate image size using the WIDTH and HEIGHT attributes comes in handy in certain circumstances. When creating a layout mock up, you can test image sizes by manipulating the code. Also, the transparent pixel GIF and single pixel rule tricks described later in this chapter rely on manipulating image width and height.

SIZING GRAPHICS FOR THE PAGE

One way to keep file sizes small is to size graphics appropriately. Nothing is worse than opening a new Web page and waiting to download a large 600 x 400 pixel image. One of the easiest ways to make your graphics download quickly is to keep their dimensions small and appropriate to the size of the page. Figure 7-10 shows a variety of image sizes at a 640 x 480 screen resolution.

FIGURE 7-10
*Sample graphic sizes at
 640 x 480 screen
 resolution*



Use these sample image sizes as guidelines when you size your graphics. You also can think of image size in relation to the number of columns in your layout. Size your graphics to occupy one, two, or more columns of the page.

REMOVING THE HYPERTEXT BORDER FROM AN IMAGE

When you create a hypertext image, the browser's default behavior is to display the hypertext border around the image, as shown in Figure 7-11. This border appears blue when new, and purple after you click the image. In a well-designed site, this border is unnecessary as users often use their mouse to point to each image to see if the hypertext cursor appears. Also, the color of the border does not always complement your graphic. To remove the hypertext border, add the `BORDER=0` attribute to your `` tag.

FIGURE 7-11
*Removing hypertext
border*



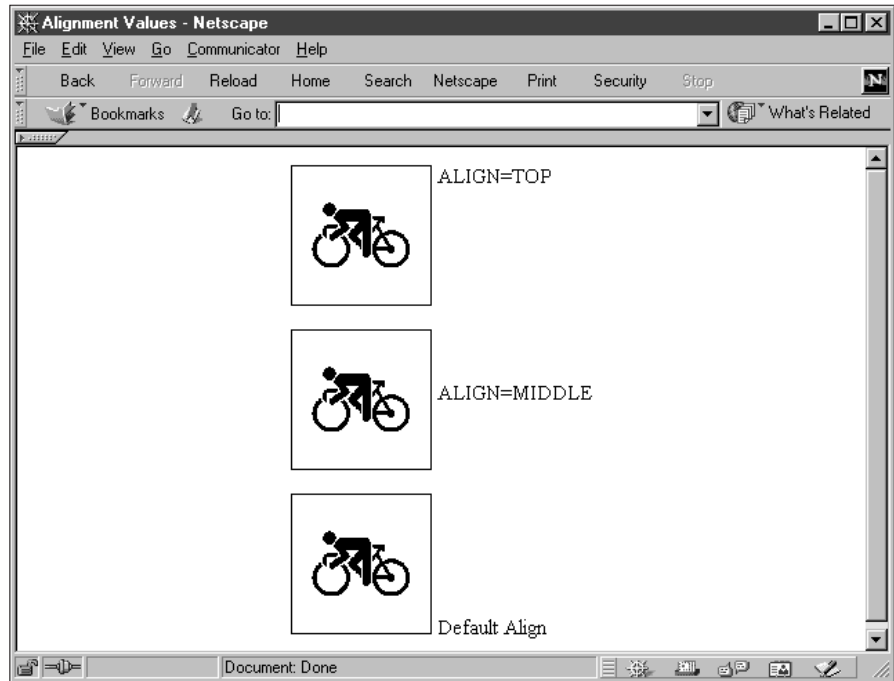
Here is the code for the second globe that has the hypertext border turned off in both standard HTML and CSS:

```
<!-- Standard HTML -->
<IMG SRC="globe1.gif" WIDTH=100 ALT="GLOBE" BORDER=0
ALIGN=MIDDLE>
<!-- CSS -->
<IMG SRC="globe1.gif" WIDTH=100 ALT="GLOBE"
STYLE="BORDER:NONE" ALIGN=MIDDLE>
```

ALIGNING TEXT AND IMAGES

You can align text along an image border using the `ALIGN` attribute. The default alignment of the text and image is bottom-aligned, which means the bottom of the text aligns with the bottom edge of the image. You can change the alignment by using either the `TOP` or `MIDDLE` values. Figure 7-12 shows all three alignment values.

FIGURE 7-12
Text alignment

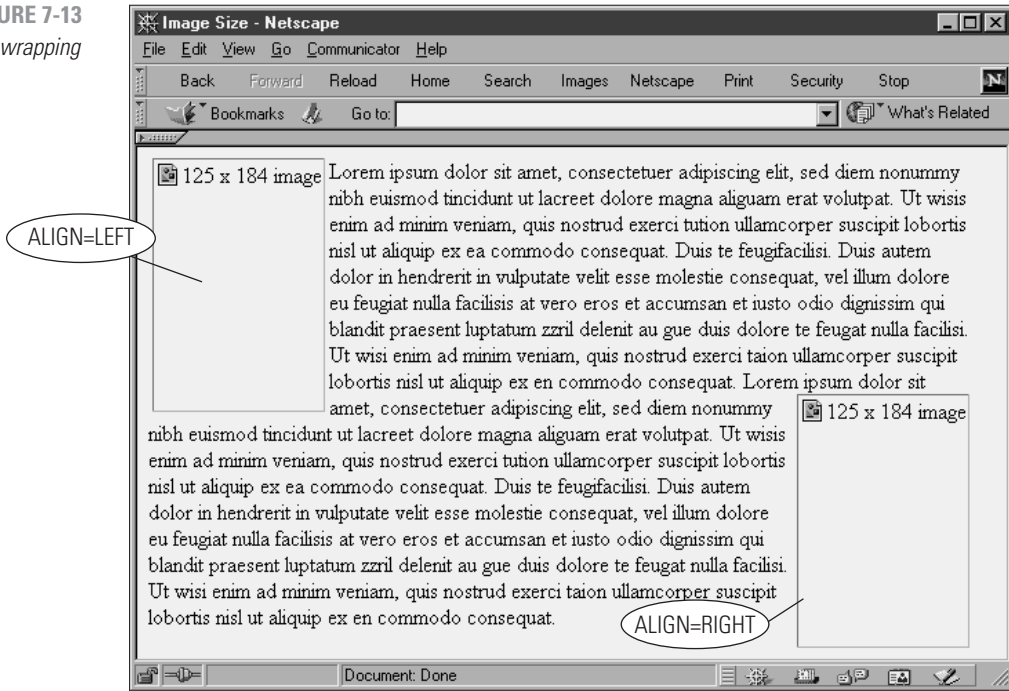


The following code shows the three types of alignment and their CSS equivalents:

```
<!-- Standard HTML -->
<IMG SRC="cycle.gif" ALIGN=TOP BORDER=1>
<IMG SRC="cycle.gif" ALIGN=MIDDLE BORDER=1>
<IMG SRC="cycle.gif" BORDER=1>
<!-- CSS -->
<IMG SRC="cycle.gif" STYLE="VERTICAL-ALIGN:TOP" BORDER=1>
<IMG SRC="cycle.gif" STYLE="VERTICAL-ALIGN:MIDDLE"
BORDER=1>
<IMG SRC="cycle.gif" BORDER=1>
```

You also can use the ALIGN attribute to wrap text around images. Figure 7-13 shows two images (the images are turned off), the first left-aligned and the second right-aligned.

FIGURE 7-13
Text wrapping



The following code shows both `` elements and the CSS equivalents:

```
<!-- Standard HTML -->
<IMG SRC="planning.jpg" WIDTH=125 HEIGHT=184 ALT="125 x
184 image" ALIGN=LEFT>
<IMG SRC="planning.jpg" WIDTH=125 HEIGHT=184 ALT="125 x
184 image" ALIGN=RIGHT>
<!-- CSS -->
<IMG SRC="planning.jpg" WIDTH=125 HEIGHT=184 ALT="125 x
184 image" STYLE="FLOAT:LEFT">
<IMG SRC="planning.jpg" WIDTH=125 HEIGHT=184 ALT="125 x
184 image" STYLE="FLOAT:RIGHT">
```

ADDING WHITE SPACE AROUND IMAGES

Add white space around your images to reduce clutter and improve readability. As shown in Figure 7-14, the default spacing is very close to the image.

FIGURE 7-14
Default image spacing



To increase the white space around an image, you can add the VSPACE and HSPACE attributes to the element and set the values to a pixel amount. In Figure 7-15, 15 pixels of space are specified for both attributes. VSPACE affects both the top and bottom sides, while HSPACE affects both left and right sides. The code looks like this:

```
<IMG ALIGN=LEFT ALT="SAILBOAT" BORDER=0
HSPACE=15 VSPACE=15 SRC="SAIL.GIF">
```

You also can add white space into the graphic itself using graphic editing software.

Cascading Style Sheets offer more control over image white space. You can apply the margin properties to individual sides of an image. The following code shows an image with a 12-point margin on the right and bottom sides, floating to the left of text:

```
<IMG ALT="SAILBOAT" BORDER=0 STYLE="MARGIN-RIGHT:12pt;
MARGIN-BOTTOM:12pt; FLOAT:LEFT" SRC="SAIL.GIF">
```

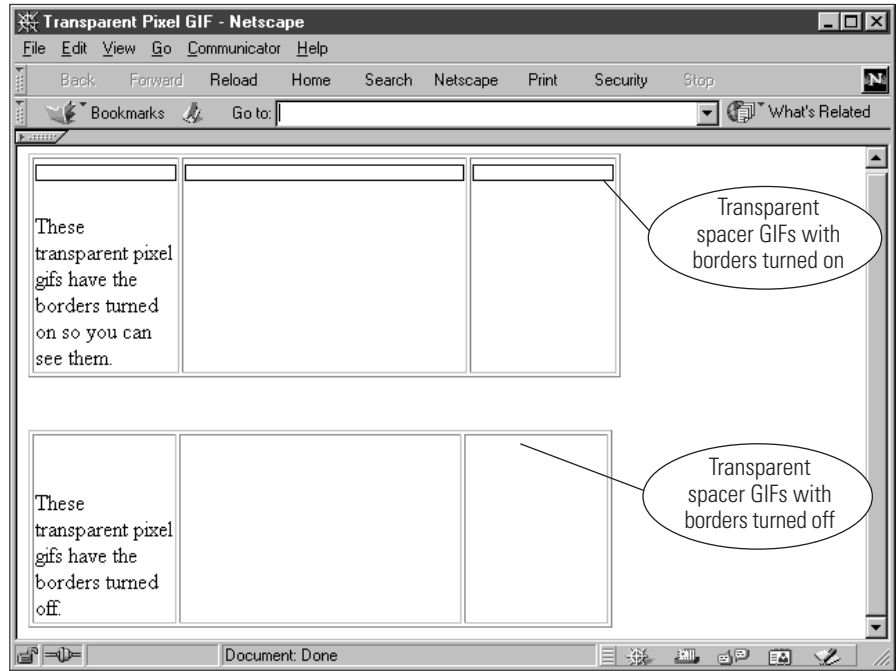
FIGURE 7-15
Adding white space
around an image



USING TRANSPARENT SPACER GIFS

As you learned earlier, when you create a GIF or PNG you can choose one color to be transparent. Imagine creating a single pixel graphic of just one color and then choosing that color to be transparent. The result would be a single-pixel transparent block, known as a **transparent spacer GIF**. The transparent spacer GIF can solve spacing problems that cannot be solved with standard HTML. You can use the **WIDTH** and **HEIGHT** attributes to change the transparent spacer GIF to any size you desire. This is a commonly used technique in Web design. One HTML editing tool, NetObjects Fusion, uses transparent spacer GIFs as an integral part in the way it builds Web pages. You can reuse the same transparent spacer GIF over and over on your Web site, and it only has to download once to the user's cache. A transparent spacer GIF file is available on the *Principles of Web Design* Companion Web Site for your use. Figure 7-16 shows an example of a three-column table with exact column widths specified by the transparent spacer GIFs at the top of each column.

FIGURE 7-16
Transparent spacer GIFs



Here is the code for the second table in Figure 7-16, showing the transparent spacer GIFs with the borders turned off.

```
<TABLE BORDER WIDTH=400>
<TR VALIGN=TOP>
<TD><IMG BORDER=0 HEIGHT=10 WIDTH=100 SRC="transpik.gif" >
<P>These transparent pixel gifs have the borders turned
off.</P>
</TD>
<TD><IMG BORDER=0 HEIGHT=10 WIDTH=200 SRC="transpik.gif" >
</TD>
<TD><IMG BORDER=0 HEIGHT=10 WIDTH=100 SRC="transpik.gif" >
</TD>
</TABLE>
```

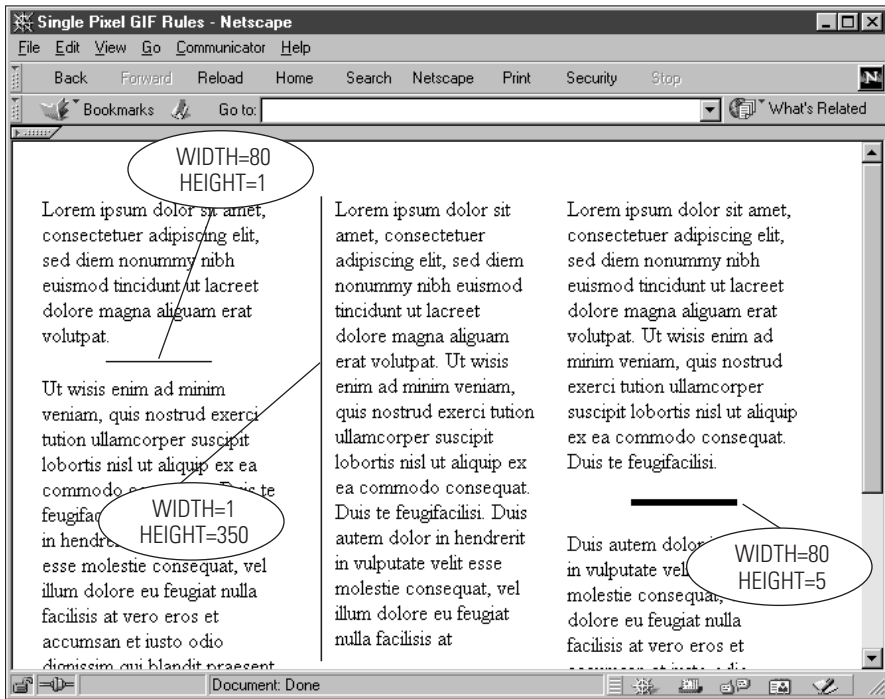
The transparent spacer GIF is occasionally the only way to accomplish a desired result. For example, you might use a transparent spacer GIF to enforce column widths in tables, or indent or align text in a nonstandard way. As Cascading Style Sheets support becomes commonplace, you should be able to forego transparent spacer GIFs altogether.

USING SINGLE-PIXEL RULES

Single-pixel lines or rules work exactly like transparent spacer GIFs, except they are a single color rather than transparent. You can change a single-pixel rule to

any size by using the WIDTH and HEIGHT attributes. This creates reusable graphics of horizontal or vertical lines of varying thickness that you can use to enhance your Web pages layout. A variety of these single-pixel rules are available for your use on the *Principles of Web Design* Companion Web Site. Figure 7-17 shows the same single-pixel black graphic stretched to different shapes and sizes by changes in the WIDTH and HEIGHT attributes in the element.

FIGURE 7-17
Single-pixel rules



Here is the code for the three rules. Notice that each SRC attribute references the same graphic:

Column One:

```
<IMG SRC="blackpix.gif" WIDTH=80 HEIGHT=1 VSPACE=10>
```

Column Two:

```
<IMG SRC="blackpix.gif" WIDTH=1 HEIGHT=350 ALIGN=LEFT  
HSPACE=10>
```

Column Three:

```
<IMG SRC="blackpix.gif" WIDTH=80 HEIGHT=5>
```

USING BACKGROUND IMAGES

You can use the BACKGROUND attribute to the <BODY> element to tile images across the background of a Web page. Any image can be used as a background

graphic, though many are not appropriate for the task. In too many Web sites, complicated background graphics distract the user. If your site includes a lot of text, avoid dark or complex backgrounds. Most text does not read well against a background image unless the image is light enough to provide a good contrast for the text. Changing the text color to create light text on a dark background sometimes improves legibility by heightening contrast as illustrated in Figure 7-18.

FIGURE 7-18
*Avoid complicated
backgrounds for
text-oriented pages*



Instead of using a dark, busy image to tile a page background, choose a light, simple image. The Web provides many images that you can use to create seamless backgrounds that do not interfere with your text. Use background images creatively to provide an identifying theme for your site, to frame your content at different screen resolutions, or to provide a light, textured background. A common technique is to use a thin ribbon graphic that will not repeat within the browser window at even the highest screen resolution. This means creating a graphic that is longer than 1024 pixels (the highest common screen resolution is 1024 x 768 pixels). Figure 7-19 shows an example from the Web. The background graphic in the Shareware Web site is a 1075 x 5 pixel graphic.

FIGURE 7-19
*1075 x 5 background
graphic from the
shareware.com
Web site*



When this graphic is used as the background, it tiles to create columns of color. Figure 7-20 shows the complete page at 800 x 600 screen resolution. The color columns created by the background graphic frame the content areas of the page.

FIGURE 7-20

Background graphic can be an important page component



Cascading Style Sheets allow you more control over background image tiling than standard HTML. To apply a background image, use the `<BODY>` element as the selector with the `BACKGROUND` property as follows:

```
BODY {BACKGROUND: URL(texture4.jpg)}
```

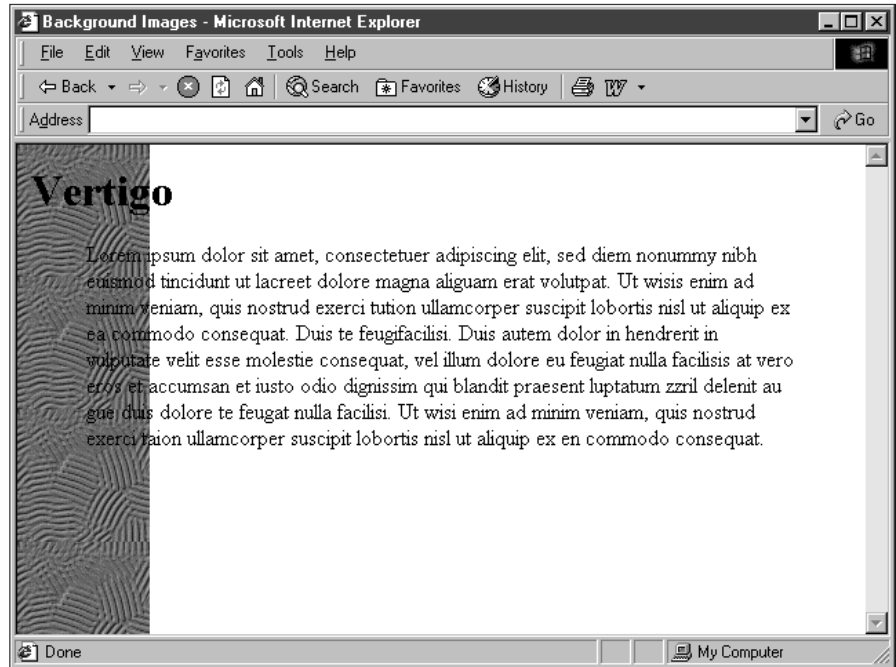
Note the URL syntax in the rule. The path and filename are contained with parentheses. The default for CSS background graphics is the same as using the `BACKGROUND` attribute. The image tiles indefinitely across the page.

The CSS `BACKGROUND-REPEAT` property allows you to create a single column or row of the image, rather than tiling the image completely across the page. Figure 7-21 shows the background image repeated on the y-axis.

Here is the rule for repeating the graphic on the y-axis:

```
BODY {BACKGROUND: URL(texture4.jpg); BACKGROUND-REPEAT:
REPEAT-Y}
```

FIGURE 7-21
Background graphic
repeated on y-axis



You also can tile across the x-axis as shown in Figure 7-22.

FIGURE 7-22
Background graphic
repeated on x-axis

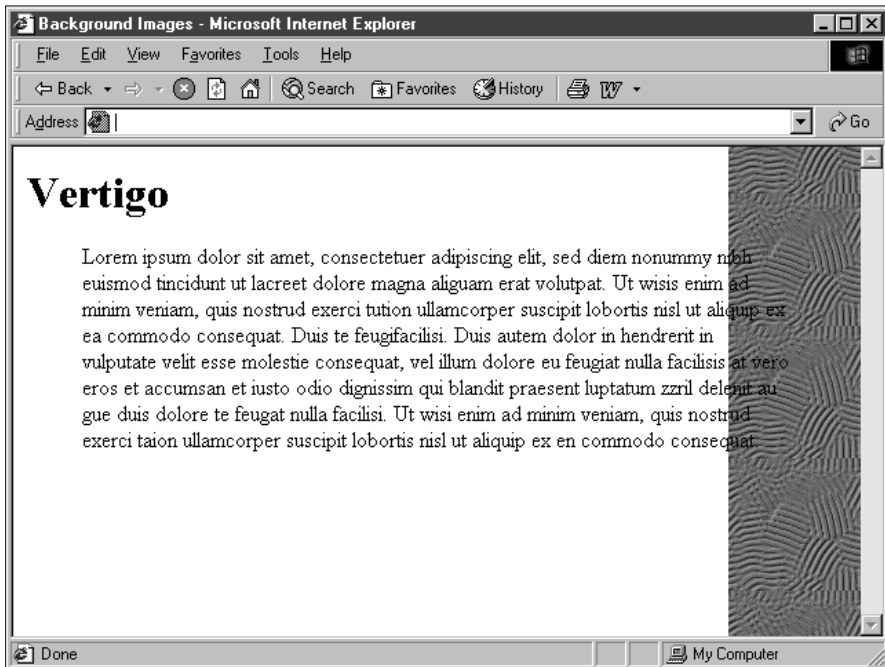


Here is the rule for repeating the graphic on the x-axis:

```
BODY {BACKGROUND: URL(texture4.jpg); BACKGROUND-REPEAT:
REPEAT-X}
```

You also can use the BACKGROUND-POSITION property to change the position of the background graphic. For example, you can create a right-aligned repeat on the y-axis as shown in Figure 7-23.

FIGURE 7-23
*Background graphic
right-aligned on y-axis*



Here is the rule for right-aligning the background:

```
BODY {BACKGROUND: URL(texture4.jpg); BACKGROUND-REPEAT:
REPEAT-Y BACKGROUND-POSITION RIGHT}
```

WORKING WITH HEXADECIMAL COLORS

HTML uses hexadecimal numbers to express RGB color values. Hexadecimal numbers are a base-16 numbering system, so the numbers run from 0 through 9 and then A through F. When compared to a standard base-10 numbering system, hexadecimal looks strange because it includes letters in the numbering scheme. Do not let hexadecimal numbers put you off. All you need is a cross-reference, or better yet, a Web page that lists all the colors. The *Principles of Web Design* Companion Web Site has an online color chart you can use. Some HTML reference books have a printed color chart of hexadecimal colors, but in general, you

always should use an online color resource for checking color values because you will get a much more realistic view of the actual color.

Hexadecimal color values are six-digit numbers; the first two define the red value, the second two define the green, and the third two define the blue. You can use these values in a variety of elements with either the BGCOLOR attribute or the COLOR attribute to define color in your Web pages. Cascading Style Sheets also accept hexadecimal color values. Hexadecimal values should always be contained in quotes and preceded by a number sign as shown:

```
<BODY BGCOLOR="#FFFFFF">
```

UNIVERSAL COLOR NAMES

Although you can use color names for many hexadecimal colors, some browsers do not support color names. When in doubt, you are better off using hexadecimal values rather than color names. The following 16 basic color names, however, are recognized by most browsers and stated in the W3C HTML 4.0 specification.

TABLE 7-5

*Color names
recognized by
most browsers
(highlighted colors
are browser safe)*

Color Name	Hex	Color Name	Hex
Aqua	00FFFF	Navy	000080
Black	000000	Olive	808000
Blue	0000FF	Purple	800080
Fuchsia	FF00FF	Red	FF0000
Gray	808080	Silver	C0C0C0
Green	008000	Teal	008080
Lime	00FF00	White	FFFFFF
Maroon	800000	Yellow	FFFF00

TIP

As described earlier in this chapter, make sure that your hexadecimal colors are browser safe. Clear Ink's Palette Man Web site at www.paletteman.com lets you pick colors directly from the Web palette. The Web site then provides the correct hexadecimal code. Alternately, you can play with your own color combinations. Browser safe hexadecimal colors always are made up of the following 2-digit color values: 00, 33, 66, 99, CC and FF. Therefore, 0066FF is a browser safe color, but 0F66FF is not.

As you can see from the hexadecimal codes, not all of these colors are browser-safe, so make sure to test your work.

To use these universal color names, state the color in the attribute value, as in the example below:

```
<BODY BGCOLOR="YELLOW">
```

SETTING BACKGROUND PAGE COLOR

One of the simplest ways to work with hexadecimal color is to specify a background color for your pages. Use the BGCOLOR attribute in the <BODY> element, or with Cascading Style Sheets, use the BACKGROUND-COLOR property with BODY as the selector. The following code examples show the background color set to white.

Standard HTML:

```
<BODY BGCOLOR="#FFFFFF">
```

Cascading Style Sheets:

```
BODY {BACKGROUND-COLOR: #FFFFFF}
```

Remember to use a color that will provide a good contrast for reading your text.

USING BACKGROUND COLOR IN TABLES

You can use background color in tables for different purposes, all by using the BGCOLOR attribute. The table <TABLE>, table row <TR>, table header <TH>, and table data <TD> elements all accept the BGCOLOR attribute. Following are a few examples.

Setting Table Background Color

You can easily set a background color for an entire table by adding the BGCOLOR attribute to the beginning <TABLE> tag. Figure 7-24 shows an example.

FIGURE 7-24

Table background color



TIP

You can work with the following three layers when designing your pages:

1. The foreground layer contains your content (text and images).
2. The middle layer displays the image specified in the BACKGROUND attribute. The specified image tiles repeatedly. With Cascading Style Sheets you have more control over the tiling of the image.
3. The background layer displays the BGCOLOR value.

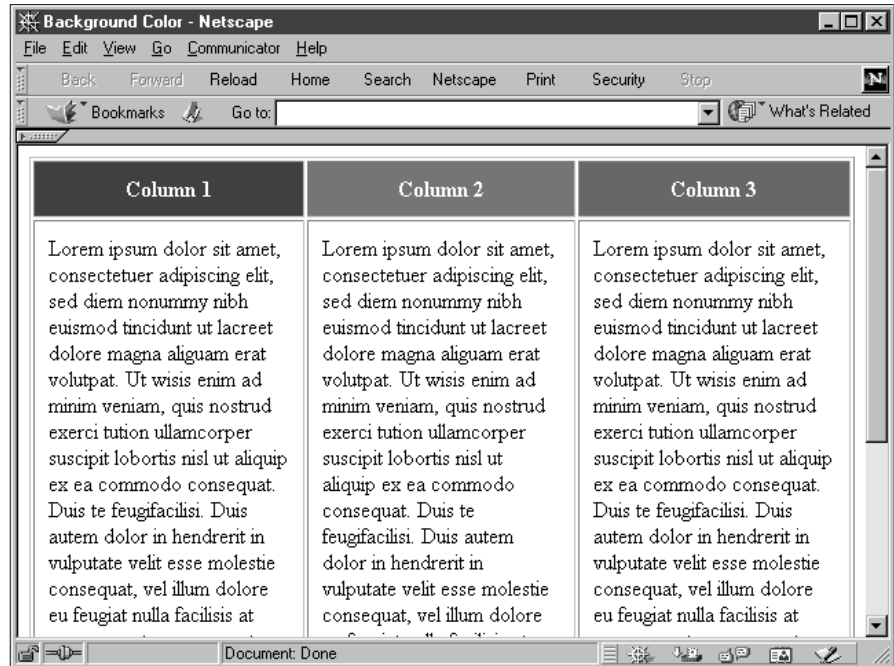
```
<TABLE CELLPADDING=5 BORDER BGCOLOR="#FFF8DC" WIDTH=300>
<TR><TH>Date</TH><TH><B>Event</B></TH></TR>
<TR><TD>2</TD><TD>Pops Night 7:00 p.m.</TD></TR>
<TR><TD>3</TD><TD>Grade 5 Musical 7 - 9</TD></TR>
<TR><TD>3</TD><TD>BF Evening 5 -7</TD></TR>
<TR><TD>3 - 4</TD><TD>Spring Book Fair</TD></TR>
<TR><TD>9</TD><TD>PTA Meeting 7:00 p.m.</TD></TR>
```

```
<TR><TD>14</TD><TD>Flag Day</TD></TR>
<TR><TD>16</TD><TD>180th Day of School</TD></TR>
</TABLE>
```

Creating Reverse Text

By using the BGCOLOR attribute to set the background color, you can create reverse text in table cells. Figure 7-25 shows the first row in the table with the BGCOLOR attribute set to red, blue, and green, respectively in each cell, and the text color set to white.

FIGURE 7-25
Table cell reverse



In this example the element is setting the text color, but a CSS rule would accomplish the same result. The code for the Column 1 cell looks like this:

```
<TH BGCOLOR="#000000"><FONT COLOR="#FFFFFF">Column
1</FONT></TH>
```

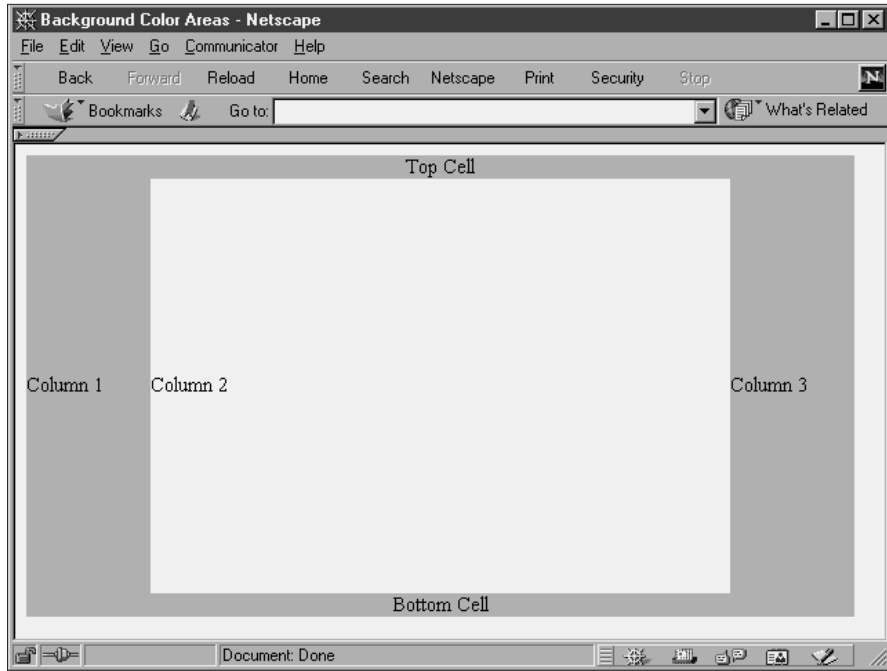
Creating Continuous Color Areas

By combining the BGCOLOR attribute with a table that has default spacing turned off, you can create continuous seamless areas of color. Remember to remove the default table spacing by setting the attribute values as shown in the following <TABLE> tag:

```
<TABLE BORDER=0, CELLPADDING=0, CELLSPACING=0>
```

If you do not remove the default spacing, you will see the separations between each cell. Figure 7-26 shows a table that uses this technique.

FIGURE 7-26
Continuous color areas



The code for the table follows:

```
<TABLE WIDTH=600 BORDER=0 CELLPADDING=0 CELLSPACING=0>
<TR><TD COLSPAN=3 BGCOLOR="#CCCCCC" ALIGN=Center>Top
Cell</TD></TR>
<TR><TD HEIGHT=300 WIDTH=15% BGCOLOR="#C0C0C0">Column
1</TD> <TD WIDTH=70%>Column 2</TD> <TD WIDTH=15%
BGCOLOR="#C0C0C0">Column 3</TD></TR>
<TR><TD COLSPAN=3 BGCOLOR="#C0C0C0" ALIGN=Center>Bottom
Cell</TD></TR>
</TABLE>
```

CHANGING LINK COLORS

You can change your hypertext link colors using hexadecimal values or standard color names. The following three attributes all reside within the `<BODY>` element:

- **LINK**: The unvisited link color. The default is blue.
- **ALINK**: The active link color. This is the color that displays when the user points to a link and holds down the mouse button. The default is red.
- **VLINK**: The visited link color. The default is purple.

Here is an example of the syntax:

```
<BODY LINK="CC3399" VLINK="9900FF">
```

Now that you have the capability of changing link colors, do not rush out and change all your links to different colors until you think about the consequences for your users. They probably are expecting the default blue and purple links. This does not mean you should not change link colors. Many sites change their links to match their design color scheme. Changing link colors is acceptable as long as you maintain color consistency and preserve the contrast between the new and visited link colors to provide a recognizable difference to the user.

SUMMARY & REVIEW

- You currently can use only three image file formats on the Web: GIF, JPG, and PNG. These formats all compress images to create smaller files. Choose the appropriate file format, or your image will not compress and appear as you expect.
- Your computer monitor displays color by mixing three basic colors of light: red, green, and blue. Colors vary widely from one monitor to another, based on both the user's preferences and the exact brand of equipment.
- Most monitors have a resolution of 72 dpi. When creating, scanning, or importing images, always change the final resolution to 72 dpi.
- Most Web designers use graphic design software to resize images or convert them from one file format to another. More complex tasks could include changing color depth or adding transparency to an image.
- Use the element to display images in a browser. It is a replaced element, meaning that the browser replaces the element with the image file referenced in the SRC attribute. The browser treats the image as it treats a character; normal image alignment is to the baseline of the text. Images that are within a line of text must have spaces on both sides, or the text will touch the image.
- Reduce image size to the appropriate dimensions for a Web page. If you must use a larger image, let the user view a thumbnail first, and provide the file size information.
- Work with a limited Web-safe palette when creating graphics.
- HTML uses hexadecimal numbers to express RGB color values. Hexadecimal color values are six-digit numbers; the first two define the red value, the second two define the green value, and the third two define the blue value. You can use these values in a variety of elements with either the BGCOLOR attribute or the COLOR attribute to define color in your Web pages. Cascading Style Sheets also accept hexadecimal color values.
- Test your work. Browsers and computing platforms render colors differently. Test at different color depths, also.

REVIEW QUESTIONS

1. What are the three image file formats you can use on a Web site?
2. Which file formats support 24-bit color?
3. Explain the file's color depth control.
4. How many colors does GIF support?
5. What is lossless file compression?

6. Which file formats support transparency?
7. What are the drawbacks of using animated GIFs?
8. Explain lossy image compression.
9. What image characteristics can you control using the JPG format?
10. Why is PNG not a popular image format?
11. What are the display characteristics of an interlaced image?
12. What are some options for acquiring images for your site?
13. Which image format should you use for a two-color company logo?
14. Which image format should you use for a photograph?
15. Which image format should you use for text with a gradient drop-shadow?
16. What happens when you display a 24-bit image on an 8-bit monitor?
17. What three attributes should you always include in the image tag? Why should you include them?
18. What is the attribute and value for removing the hypertext border for an image?
19. How many layers can you work with when designing pages?
20. Which table elements accept the BGCOLOR attribute?

PROJECTS

1. Practice using the ALIGN image attribute:
 - a. Download an image from the *Principles of Web Design* Companion Web Site or find an image of your own.
 - b. Add text around the image. Experiment with the ALIGN attribute and its values to view the way text wraps.
 - c. Test the work in multiple browsers to verify that the text wraps consistently.
2. Practice using the spacing image attributes:
 - a. Download an image from the *Principles of Web Design* Companion Web Site or find an image of your own.
 - b. Add text around the image. Experiment with the HSPACE and VSPACE attributes to add white space around the image.
 - c. Test the work in multiple browsers to verify that the text spacing is consistent.
3. Practice using WIDTH and HEIGHT image attributes:
 - a. Download an image from the *Principles of Web Design* Companion Web Site or find an image of your own.
 - b. Build a simple page that contains text and multiple images. Do not include the WIDTH and HEIGHT attributes in the IMG tag.
 - c. With the images turned off in your browser, view the page.
 - d. Add the appropriate width and height information to the tag for each image.
 - e. Again, turn the images off in your browser and view the page. Note the differences between the two results and the way your layout is affected.
4. Download the transparent spacer GIF from the *Principles of Web Design* Companion Web Site (transpix.gif).
 - a. Build a simple layout.
 - b. Test the capabilities of the transparent spacer GIF. Change the WIDTH and HEIGHT attributes to manipulate the size of the image and its spacing on the page.

5. Download one of the single-color pixel graphics from the *Principles of Web Design* Companion Web Site (bluepix.gif, redpix.gif, blackpix.gif, graypix.gif).
 - a. Build a simple layout.
 - b. Test the capabilities of the single-pixel GIFs. Change the WIDTH and HEIGHT attributes to manipulate the size of the image and its use on the page.
6. Experiment with background color in tables. Use the BGCOLOR attribute at different levels of a sample table to add color. Test the result in both Internet Explorer and Netscape Navigator. Note the ways that both browsers handle table color.
7. Browse the Web for sites that make effective use of background images. Choose a Web site and write a short design description of how the background images enhance the site.
8. Browse the Web for sites that make effective use of color. Pick a site that has a definite color scheme, and write a short design critique that explains how the use of color enhances the site.

CASE STUDY

Gather or create the boilerplate graphics to use on the different pages of your site. These include any banner, navigation, section, or identifying graphics. Add these graphics to the test pages of your site. Test the images in multiple browsers to make sure they display properly.

Determine the color choices for your Web site. Pick the colors you will use for text, background color in tables, and page backgrounds. If you will be using single-color graphics, such as lines or bullets, create them now.

Establish graphics standards for your Web site, including but not limited to the following:

- Determine if you will use a standard amount of white space around each graphic.
- Determine exactly which attributes should be included in all tags.
- Formulate a standard for all ALT attributes.
- Formulate a lowest common denominator set of image standards for your site. This will be used as the base-level display standard for testing your graphics.

Write a short standards document that can be provided to anyone contributing to the site.